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SOURCE "Schrottindustrie in der UdSSR," Gmelin-Institut, Berlin, (GMDs No VII-66-c-12-44/159).

SCRAP METAL INDUSTRY IN THE USSR

The following information is taken from a German document presumably prepared during 1940 - 1941 by the Gmelin-Institut in Berlin as part of a series of studies concerning the natural resources of the USSR which had been requested by the High Command of the German Armed Forces.

This German data was based on Soviet sources, and some 1942 figures had been calculated by the German researchers. All figures have been copied exactly as the German text gave them, and any discrepancies in the totals appeared in the original.

Two tables and five figures are appended.

Scrap Formation

Scrap iron is one of the most important raw materials in the production of open-hearth steel. The proportion of scrap iron used for this purpose depends on the smelting methods and the conditions prevailing in individual countries. Where hot iron is used, the average amount of scrap in the open-hearth process is 53 percent in the United States, 48 percent in Britain, 66 percent in Germany, and only 23-25 percent in the USSR. This high percentage of hot iron used in the USSR can be explained by the large reserves of iron ore in that country.

During the Third Five-Year Plan which provided for an increased steel output, steps were taken to make more extensive use of available scrap metal. At a conference in Khar'kov in May 1939, it was decided that the proportion of hot iron used in open-hearth furnaces should not exceed 65 percent (average yearly coefficient). This would entail a larger share of scrap metal used in the steel-smelting process.

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Scrap metal in the USSR is obtained from the following sources:

1. Scrap formed as a result of worn-out machinery, equipment, etc.
2. Scrap from metal household equipment and consumers' goods
3. Current waste metal from the construction industry
4. Current waste metal from the metallurgical industry
5. Current waste metal from the metalworking industry
6. Processing of slag dumps (temporary source)

Since the amount of available scrap metal depends largely on the total metal reserves of a country, an attempt is made below to estimate USSR metal reserves from 1928 to 1939. The metal reserves are estimated on the basis of indirect data, as it was not possible to obtain the metal weight of all iron-containing equipment and commodities. According to statistical data, the USSR metal reserves increased as follows between 1928 and 1939 (in 1,000 tons):

<u>1928</u>	<u>1929</u>	<u>1930</u>	<u>1931</u>	<u>1932</u>	<u>1933</u>
31,809	34,556	38,005	41,523	46,727	51,530
<u>1934</u>	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>
56,299	62,219	69,172	79,055	89,173	99,604

According to calculations of "Giprostal" (State Institute for Planning Steel Enterprises), the metal reserves as of 1 January 1939 were as follows (in tons):

Iron reserves according to data of various people's commissariats, including private housing	89,820,000
Iron content in slag dumps	3,450,000
Iron content in sows	2,262,000
Iron-containing consumers' goods	2,850,000
Total	98,382,000

These metal reserves may be divided into the following metal types:

Steel	75 percent
Cast iron	20 "
Alloyed Steel	2 "
Thin sheet metal, up to 3 mm	3 "

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Soviet metal reserves as of 1 January 1939 were composed of the following
for 1943 data, see Figure 27:

	<u>Metal Weight</u> <u>(1,000 tons)</u>	<u>Percent</u> <u>of Total</u>
<u>Means of Production</u>		
Machines, machine tools, transmissions	13,969.1	15.78
Auxiliary tools and instruments	329.8	.37
Power machinery and equipment	3,119.2	3.52
Communications and transportation equipment	12,315.6	13.91
Buildings and structures (including bridges)	31,265.9*	35.32
Merchant Marine	1,952.0	2.20
Floating equipment	16.4	.02
Inventories	268.9	.30
Supplies	1,070.2	1.21
Capital equipment in timber, fish, and agri- cultural industries	68.6	.08
Total of means of production	64,375.7	72.71
Nonindustrial equipment, unfinished buildings, service equipment, etc.	24,155.6	27.29
Total of equipment	89,819.8	100.00
Iron in waste dumps, slags, and sows	3,450.0	
Iron stock in warehouses on 1 Jan 1939	2,261.8	
Metal consumers' goods in use	2,850.0	
Total USSR metal reserves	98,381.6	

* Including 19,482,000 tons of railroad rails

Based on the total USSR metal reserves as of 1 January 1939, as well as the average utilization of metal scrap from worn-out machinery and equipment and the coefficients of utilization of various types of iron and steel, the increase in the amount of metal reserves during the Third Five-Year Plan is calculated in percent over 1939 as follows:

1 Jan 1939	100 percent
1 Jan 1940	116 "
1 Jan 1941	130 "
1 Jan 1942	149 "
1 Jan 1943	170 "

Calculations of the general increase in metal reserves in various branches of national economy were made on the basis of data of the State Planning Commission on capital investments of individual branches of industry during the Third Five-Year Plan. The results are compiled in the following table. [Also see Figure 1.]

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Branch of Industry	Metal Reserves			
	1 Jan 1939		1 Jan 1943	
	1,000 Tons	Percent of Total	1,000 Tons	Percent of Total
Transport and communications	31,295.0	33.77	40,233.5	25.65
Including railroads	(27,932.0)	(30.14)	(34,550.4)	(22.03)
Fuel industry	4,435.4	4.79	9,248.8	5.90
Metallurgical and chemical industries	6,449.5	6.96	13,479.8	8.60
Including ferrous metallurgy	(4,379.3)	(4.73)	(6,950.9)	(4.44)
Machine building and power industry	4,399.3	4.74	10,057.3	6.41
Construction and timber in- dustry	1,366.1	1.47	3,364.1	2.14
Light industry	2,006.4	2.17	5,367.0	3.43
Food industry	3,444.5	3.72	5,929.1	3.79
Agriculture	6,919.7	7.47	10,002.9	6.38
Republic industries	9,560.1	10.32	15,210.5	9.70
Industrial Cooperatives	309.6	.33	437.1	.28
Other branches of industry	19,633.5	21.19	39,684.8	25.31
Household equipment	2,850.0	3.07	3,771.1	2.41
Total	92,669.8	100.00	156,786.0	100.00
Iron content in waste dumps and scows	3,450.0		1 900.0	
Iron stocks in the metal- lurgical and metalworking industries	2,261.8		2,261.8	
Total metal reserves	98,381.6		160,947.8	

On the basis of plans of various people's commissariats, the metal re-
serves are distributed by regions as follows:

Region	Metal Reserves (1,000 tons)	
	1 Jan 1939	1 Jan 1943
Dnipro and adjacent areas	10,309.5	16,251.3
Donbass, Caucasus, and adjacent areas	18,922.8	32,113.2
Central regions of USSR and Northern European USSR	38,490.4	67,304.9
Urals and adjacent areas	9,936.6	17,363.0
Siberia, Central Asia, and Far East	15,011.5	23,753.6
	92,669.8 *	156,786.0 *

* Not including iron in dumps and in stocks

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According to calculations of "Giprostal", the average coefficient of scrap formation for various types of machinery and equipment is as follows:

Machines, machine tools, transmissions	5.66
Auxiliary tools and instruments	14.42
Power machinery and installations	3.97
Communications and transportation equipment	7.74
Buildings and structures	2.36
Merchant Marine	2.91
Ship superstructures	7.62
Inventories	7.45
Capital equipment in timber, fish, and agricultural industries	0.83
Agriculture	8.62
Trade	3.50
Housing construction	1.68
Service and supply organizations	3.00

The distribution of scrap formation in 1939 in individual branches of industry, according to data of "Giprostal", was as follows:

<u>Branch of Industry or Services</u>	<u>Scrap Formation</u>	
	<u>Tons</u>	<u>Percent of Total</u>
Transportation and communications	1,167,200	39.57
Including railroads	(1,071,900)	(36.34)
Fuel industry	161,000	5.46
Metallurgical and chemical industries	287,800	9.76
Including ferrous metallurgy	(191,000)	(6.48)
Machine building and power industry	143,600	4.87
Construction and timber industry	53,000	1.80
Light industry	70,100	2.37
Food industry	151,800	5.13
Agriculture	455,100	15.43
Republic industries	232,900	7.89
Industrial Cooperatives	10,800	0.37
Other branches of industry	216,500	7.35
Total	2,949,800	100
Household scrap metal	154,200	
Total	3,104,000	

The total amount of scrap metal (worn-out machinery, equipment, etc.) for the year 1942, without taking into consideration any losses occurring between the formation of scrap and the time of its utilization, is estimated at 4,470,000 tons; after taking scrap losses into consideration, the total amount is estimated at 3,993,000 tons (or approximately 4 million tons).

The distribution of available scrap among individual branches of industry in 1942 is shown in the following table:

<u>Branch of Industry</u>	<u>Scrap Formation</u>	
	<u>Tons</u>	<u>Percent of Total</u>
Transportation and communications	1,223,400	30.63
Including railroads	(1,104,900)	(27.66)
Fuel industry	248,700	6.22

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<u>Branch of Industry</u>	<u>Scrap Formation</u>	
	<u>Tons</u>	<u>Percent of Total</u>
Metallurgical and chemical industries	446,000	11.17
Including ferrous metallurgy	(245,100)	(6.14)
Machine building and power industry	240,300	6.03
Construction and timber industry	89,900	2.25
Light industry	140,600	3.53
Food industry	197,900	4.96
Agriculture	514,400	12.88
Republic industries	265,500	6.65
Industrial Cooperatives	11,800	.30
Other branches of industry	416,800	10.44
Household scrap	197,700	4.94
Total	3,993,000	100.00

Most of the metallurgical and metalworking enterprises have fairly large quantities of unused iron in their dumps and furnace sows, which are usually not utilized sufficiently. These reserves accumulate for many years, partly because the plant has no facilities for processing this waste material and partly because the USSR has not always fully realized the importance of a planned utilization of such reserves. The total amount of iron in slag dumps and furnace sows as of 1 July 1939 was calculated as 3.5 million tons. The following table shows the iron content of sows and dumps and the planned processing of scrap in 1942 by various people's commissariats (in tons):

<u>People's Commissariat</u>	<u>Iron Content of Dumps and Sows</u>		<u>Planned Metal Extraction in 1942</u>		
	<u>As Stated by Plants</u>	<u>As Calculated by Giprostal'</u>	<u>Total</u>	<u>Steel</u>	<u>Pig Iron</u>
Heavy Industry	1,818,700	2,884,500	756,000	630,000	126,000
Heavy Machine Building	70,300	112,700	33,000	33,000	--
Medium Machine Building	No data	122,000	31,000	26,000	5,000
General Machine Building	3,400	3,400	2,000	2,000	--
Transportation	No data	20,000	5,000	5,000	--
Local Industry	No data	No data	2,000	2,000	--
Electrical Industry	4,100	4,100	3,000	3,000	--
Other people's commissariats	No data	303,000	113,000	114,000	3,000
Total	--	3,449,700	945,000	811,000	134,000

The processing of dumps was to be speeded up during the period 1939 - 1941, so that according to estimates the iron reserves in dumps at the beginning of 1942 would amount to only 2.5 million tons, of which about 945,000 tons (40 percent) were to be processed during 1942.

The current waste produced by enterprises of individual people's commissariats during the year 1939 was computed from the difference between the amount of processed iron and the finished iron product. The results are shown in the following table (in 1,000 tons):

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<u>Branch of Industry</u>	<u>Total Waste</u>	<u>Steel Scrap</u>	<u>Steel Shavings</u>	<u>Cast Iron</u>	<u>Alloyed Steel</u>	<u>Thin Sheet Iron</u>
Transportation and communications	261.2	76.6	127.4	54.2	0.5	2.5
Including railroads	(246.2)	(71.0)	(124.6)	(50.1)	(0.5)	--
Fuel industry	133.6	55.7	36.4	33.3	2.6	5.5
Metallurgical and chemical industry	6,476.2	4,172.1	111.0	1,557.9	388.3	246.9
Including ferrous metallurgy	(6,440.4)	(4,160.1)	(103.1)	(1,544.8)	(387.6)	(244.9)
Machine building and power industry	2,199.6	791.4	357.2	837.6	132.2	80.9
Construction and timber industry	113.4	24.3	4.6	79.1	--	5.4
Light industry	31.4	3.2	4.7	21.2	0.4	1.9
Food industry	37.3	7.6	5.4	15.9	0.1	8.3
Agriculture	41.3	3.4	4.8	29.9	1.5	1.7
Republic industries	108.8	34.2	10.9	41.8	--	21.9
Industrial co-operatives	235.8	112.2	16.2	7.6	--	99.8
Total	9,638.6	5,281.1	678.8	2,678.5	525.6	474.8

In the opinion of Soviet experts, the amount of current production waste was in some cases too high because of bad planning, defective casting, poor construction, etc., and it was to be reduced as much as possible during the Third Five-Year Plan.

In enterprises of ferrous metallurgy (People's Commissariat of Ferrous Metallurgy) production waste for the year 1942 in various branches of industry is estimated as follows:

<u>Branch of Production</u>	<u>Current Waste</u>
Blast furnace: dross, etc.	0.020 - 0.040 ton per ton of pig iron
Open-hearth and electric steel plant	0.060 - 0.080 ton per ton of steel
Bessemer and Thomas steel plant	0.030 - 0.050 ton per ton of steel

The total amount of waste from current production in enterprises of ferrous metallurgy is estimated at 7,851,970 tons (in 1939, 6,440,377 tons). This amount is distributed as follows (in tons):

Steel chips	5,299,000
Steel shavings	115,500
Pig iron	1,512,900
Alloyed steel	474,800
Thin sheet iron	449,700

The total amounts of current waste in various branches of industry for the year 1942 are estimated as follows:

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Branch of Industry	Current Waste	
	Tons	Percent of Total
Transportation and communications	230,200	1.50
Including railroads	(215,100)	(1.40)
Fuel industry	141,600	0.91
Metallurgical and chemical industries	7,899,800	51.50
Including ferrous metallurgy	(7,851,900)	(51.19)
Machine building and power industry	2,818,400	88.37
Construction and timber industry	136,800	0.89
Light industry	30,000	0.19
Food industry	37,600	0.24
Agriculture	36,300	0.24
Republic industries	211,500	1.38
Industrial Cooperatives	258,000	1.68
Other branches of industry	<u>3,527,700</u>	<u>23.10</u>
Total	15,337,900	100.00

The total current waste from the construction industry, consisting mainly of scrap from steel structures, was estimated at 233,753 tons for the year 1942.

Scrap Requirements

Scrap is used in great quantities in the production of open-hearth steel, cast iron, alloyed steel, and partly in the production of pig iron. To estimate the scrap requirements for the entire USSR, it is best to take the 1937 figures for scrap requirements, because more exact data is available for that year.

	Tons
1937 production:	
Pig iron	14,470,000
Steel	17,630,000
1937 scrap requirements:	
For pig iron production	1,606,000
For steel production	8,144,000
For cast iron and alloyed steel production	<u>2,222,000</u>
Total	11,972,000

In taking the 1942 plan, which provided for a pig iron output of 22 million tons and a raw steel output of 28 million, and considering the fact that according to an official decree the amount of scrap used in blast furnaces had been reduced to 50 percent of the amount used in 1937, while scrap consumption by other industries remained more or less stable, the scrap requirements for 1942 can be estimated in millions of tons on the basis of the following formula: $(12.0 - 1.6 \times 0.5) \times 1.58 = 17.7$ million tons, where 12.0 is the amount of scrap consumption in 1937 in million tons, 1.6 is the amount of scrap used in blast furnaces in million tons, 0.5 is the factor of the required reduction of scrap to be used in blast furnaces, and 1.58 is the factor of the increase in steel production in 1942 over 1937.

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Accordingly, to fulfill the 1942 plan it would be necessary to procure at least 14 to 14.2 million tons of iron and steel scrap.

In the course of fulfilling the Third-Five-Year Plan, the following minimum norms to be used for scrap iron with hot metal were set by the "Giprostal'" Institute:

<u>Type of Steel</u>	<u>Minimum Use of Scrap (ton per ton of steel)</u>
Open-hearth steel	0.411
Bessemer steel	0.039
Electric steel	0.807

The following maximum norms for use of scrap iron in blast furnaces were established for 1942:

<u>Type of Pig Iron</u>	<u>Maximum Use of Scrap (ton per ton of pig iron)</u>
Open-hearth pig iron	0.050
Foundry pig iron	0.060

The total amount of scrap required for metallurgical purposes in all enterprises of the People's Commissariat of Ferrous Metallurgy in 1942 was determined by "Giprostal'" as 10,748,700 tons. This amount may be divided as follows between different types of scrap iron (in tons):

Steel scrap (including shavings and thin sheet)	9,051,700
Cast iron scrap	1,216,500
Alloyed steel scrap	480,500

In all other industries, where less detailed data is available, scrap requirements for the production of iron and steel are estimated at 7,183,500 tons, distributed as follows (in tons):

Steel scrap (including shavings and thin sheet)	3,942,500
Cast iron scrap	2,740,300
Alloyed steel scrap	500,700

Scrap Balance

To obtain a summary of the figures pertaining to scrap formation, scrap consumption, and scrap processing, it is necessary once more to give the data on scrap sources in various industries, to show the differences between various branches of industry in relation to scrap formation. The following table contains data available for the year 1942. [Also see Figures 3 and 4.]

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Branch of Industry	Current Production Waste		Current Waste from Construction		Processing of Slag Dumps		Scrap From Worn-Out Machines		Total Scrap Formation	
	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent	1,000 Tons	Percent
Transportation and communications	230.2	1.50	14.0	5.97	5.0	0.53	1,223.4	30.63	1,472.6	7.18
Including rail-roads	(215.1)	(1.40)	(11.3)	(4.83)	(5.0)	(0.53)	(1,104.9)	(27.66)	(1,336.3)	(6.52)
Fuel industry	141.6	0.91	20.5	8.77	--	--	248.7	6.22	410.8	2.0
Metallurgical and chemical industry	7,899.8	51.50	41.5	17.75	756.2	80.0	446.0	11.17	9,143.5	44.58
Including ferrous metallurgy	(7,851.9)	(51.19)	(19.0)	(8.13)	(756.2)	(80.0)	(245.1)	(6.14)	(8,872.2)	(43.26)
Machine building and power industry	2,818.4	18.37	25.7	10.98	69.0	7.30	240.3	6.03	3,153.4	15.37
Construction and timber industry	136.8	0.89	3.6	1.54	--	--	89.9	2.25	230.3	1.12
Light industry	30.0	0.19	3.7	1.58	--	--	140.6	3.53	174.3	0.85
Food industry	37.6	0.24	6.5	2.79	--	--	197.9	4.96	242.0	1.18
Agriculture	36.3	0.24	0.8	0.35	--	--	514.4	12.88	551.5	2.69
Republic industries	211.5	1.38	14.5	6.20	2.0	0.21	265.5	6.65	493.5	2.41
Industrial co-operatives	258.0	1.68	0.2	0.09	--	--	11.8	0.30	270.0	1.32
Other branches of industry	3,537.7	23.10	102.8	43.98	113.0	11.96	416.8	10.44	4,170.3	20.34
Consumers' goods	--	--	--	--	--	--	197.7	4.94	197.7	0.96
Total	15,337.9	100.0	233.8	100.0	945.2	100.0	3,993.0	100.0	20,509.9	100.0

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The preceding table shows the differences in scrap formation in various industries. More than 50 percent of production waste is supplied by ferrous metallurgy, 40 percent by the machine-building, electrical, and armaments industries, and about 10 percent by other branches of national economy. With regard to the processing of slag dumps, ferrous metallurgy is the leading branch of industry, but other industries supply more scrap from worn-out equipment.

Various types of scrap in the USSR may be distributed as follows in 1942:

<u>Type of Scrap</u>	<u>Percent</u>
Current production waste	74.8
Including ferrous metallurgy enterprises	(38.3)
Current waste from construction	1.1
Iron from processed slag dumps	4.6
Worn-out machinery, etc.	19.5
Including household scrap	(1.0)

The above figures show that about 75 percent of scrap is supplied by current production waste, and about half of that amount comes from metallurgical plants.

The total scrap requirements for 1942 were estimated at 19,292,800 tons. This includes 10,748,700 tons for ferrous metallurgy enterprises and 7,183,500 tons for remelting purposes of other industries; in addition, 1,360,600 tons are required for reworking and for producing consumers' goods. Accordingly, the proportion of scrap used for nonmetallurgical purposes in 1942 was about 7 percent, as against 1-2 percent during the Second Five-Year Plan. The remaining 93 percent of the total scrap requirement for 1942 are distributed as follows:

<u>Type of Iron</u>	<u>Percent</u>
Steel	68-70
Cast iron	17-18
Pig iron and ferroalloys	6-7

This shows that the distribution of scrap requirements in the USSR for the year 1942 is similar to that in the United States, and differs from the USSR distribution during the Second Five-Year Plan insofar as the use of scrap for nonmetallurgical purposes and the consumption of scrap in the production of steel have greatly increased, while the proportion of scrap used for pig iron production has been reduced.

The total figures for scrap requirements and scrap formation in the USSR as calculated for 1942, are shown in the following table (in tons):

<u>Type of Scrap</u>	<u>Formation</u>	<u>Requirement</u>	<u>Difference</u>
Steel scrap (including shavings and thin sheet)	14,926,800	14,354,800	+572,000
Cast iron scrap, different kinds	4,497,000	3,956,800	+540,200
Alloyed steel scrap, different kinds	<u>1,086,100</u>	<u>901,200</u>	<u>+104,900</u>
Total	20,509,900	19,292,800	1,217,100

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Accordingly, there is a scrap surplus of approximately 6 percent of the total reserves. This surplus should be supplied to steel plants and iron foundries.

With regard to individual branches of industry, the balance between scrap supply and demand for the year 1942 is calculated on the basis of data from individual ferrous metallurgy enterprises and total figures obtained from other people's commissariats, as shown in the appended tables.

As seen from these tables, the available scrap quantities are sufficient to increase the average amount of scrap used in open-hearth furnaces to 47 or 48 percent, that is, to raise the average use of scrap from 0.411 to 0.466 ton per ton of open-hearth steel.

In considering the importance of various branches of industry in their relation to scrap reserves in the USSR, we notice a similarity to conditions in the United States: in both countries ferrous metallurgy plays the major role, but agriculture and railroad transport also present considerable sources of scrap formation. With regard to scrap consumption, however, there are considerable differences between the two countries. A fairly large amount of scrap in the USSR is supplied by the "nonmetallurgical" branches of industry which have large reserves of metal.

The regional distribution of scrap shows that some areas have a shortage of scrap, while others have a surplus. Regions consuming large quantities of scrap, such as the Urals and the Donbass must cover their shortages by shipping supplies from central and eastern areas. On the other hand, some distant regions in Central Asia and Transcaucasus have a large surplus of scrap metal and no suitable processing centers. These scrap reserves were to form the basis of new metallurgical plants to be built in these areas during the Fourth Five-Year Plan. There is also a surplus of scrap in Azerbaydzhan, Georgia, Armenia, Uzbekistan, Turkmenia, Kirgizia, and Kazakhstan, where small metallurgical plants for local needs are to be built.

[Tables and figures follow.]

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Regional Distribution of Scrap Metal Estimated for 1942
(1,000 tons)

Regions	Formation of Scrap Metal											
	Total	In %	Steel Chips	In %	Steel Shavings	In %	Cast-Iron Waste	In %	Ferro-alloy Waste	In %	Thin Sheet Metal Waste	In %
Ural Region and adjacent areas	3,623.1	17.7	2,342.0	18.5	128.3	9.9	720.7	16.1	109.7	10.1	322.4	32.6
Donbass, Caucasus, and adjacent areas	5,191.1	25.3	3,381.5	26.8	283.6	22.1	1,171.5	26.2	218.0	19.9	136.5	13.8
Central Industrial Region and Northern European USSR	5,986.5	29.1	3,152.7	24.9	617.6	48.0	1,491.2	33.0	458.5	42.2	266.5	26.8
Ural Industrial Region	4,098.6	20.0	2,564.5	20.3	213.7	16.8	804.6	17.9	286.1	26.4	29.7	23.1
Siberia, Central Asia, and Far East	1,620.6	7.9	1,208.6	9.7	42.5	3.2	309.0	6.8	13.8	1.4	36.7	3.7
Total	20,509.9	100	12,649.3	100	1,285.7	100	4,497.0	100	1,086.1	100	91.8	100
	[sic]			[sic]								

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Total Scrap Metal Require- ment	In %	Scrap Metal Received From Other Sources	In %	Shipments of Scrap Metal												Thin Sheet Metal Waste	In %
				Total	In %	Steel Chips	In %	Steel Shav- ings	In %	Cast- Iron Waste	In %	Ferro- alloys Waste	In %				
3,585.8	18.5	1,127.1	16.2	1,164.3	14.2	706.2	15.4	79.0	8.6	294.2	15.4	19.7	6.4	65.4	14.7		
5,389.5	27.9	1,995.5	28.8	1,796.9	22.1	1,013.9	22.1	216.3	23.8	452.9	23.6	36.9	12.0	76.9	17.4		
4,742.8	24.4	1,797.0	25.1	3,040.5	37.1	1,577.4	34.2	422.2	46.4	646.5	33.8	172.8	56.6	221.6	50.0		
4,392.3	23.2	1,593.2	22.9	1,299.8	16.0	704.6	15.4	160.1	17.6	317.8	16.7	61.4	20.1	55.9	12.6		
1,182.4	6.0	440.9	6.4	869.3	10.6	597.7	12.9	33.1	3.6	199.8	10.5	15.2	4.9	23.5	5.3		
19,292.8	100	6,953.7	100	8,170.8	100	4,599.8	100	910.7	100	1,911.2	100	306.0	100	443.1	100		

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General Scrap Situation, As Estimated for 1942
(1,000 tons)
[Also see Figures 3, 4, and 5]

Formation of Scrap Metal

<u>Industry</u>	<u>Total</u>	<u>In %</u>	<u>Steel Chips</u>	<u>In %</u>	<u>Steel Shavings</u>	<u>In %</u>	<u>Cast-Iron Waste</u>	<u>In %</u>	<u>Ferro-alloys Waste</u>	<u>In %</u>	<u>Thin Sheet Metal Waste</u>	<u>In %</u>
Transportation and communication	1,472.6	7.18	1,092.1	8.63	110.9	8.63	235.0	5.23	1.3	.13	33.3	3.35
Including: rail-road transport	1,336.3	6.52	991.9	7.84	108.1	8.41	207.3	4.61	0.5	.05	28.5	2.87
Fuel industry	410.8	2.0	265.5	2.10	38.2	2.97	83.7	1.86	5.3	.48	18.1	1.83
Metallurgical and chemical industry	9,143.5	44.58	6,299.0	49.79	162.2	9.81	1,782.0	39.62	478.4	44.05	457.9	46.16
Including: ferrous metallurgy	8,872.2	43.26	6,107.4	48.28	115.5	8.98	1,724.8	38.35	474.8	43.72	449.7	45.34
Machine building and power industry	3,153.4	15.37	1,260.4	9.97	462.3	35.97	1,151.7	25.61	164.4	15.13	114.6	11.56
Construction and timber industry	230.2	1.12	101.3	.80	5.4	.42	114.2	2.54	1.4	.13	8.0	.81
Light industry	144.3	.85	115.3	.91	4.7	.36	48.0	1.07	1.2	.12	5.1	.51
Food industry	242.0	1.18	167.0	1.32	5.4	.42	56.4	1.25	0.2	.02	13.0	1.31

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Requirement of Scrap Metal

Total Scrap Metal Require- ment	P r o d u c t i o n o f M a i n C o m m o d i t i e s										Scrap Metal Received From Other Sources	In %
	In %	Total	In %	Steel Chips, Shavings, Thin Sheet Metal	In %	Cast- Iron Waste	In %	Ferro- alloys Waste	In %			
470.9	2.44	245.8	1.36	94.2	.72	151.6	5.33	--	--	152.3	7.19	
450.5	2.34	225.5	1.26	85.0	.65	140.5	3.55	--	--	150.0	2.16	
182.2	.94	164.7	.92	100.1	.77	62.9	1.59	1.7	.17	51.4	.74	
11,753.9	60.92	10,871.7	60.64	9,120.1	70.18	1,269.0	32.07	482.6	49.18	4,525.1	65.08	
11,624.9	60.25	10,743.7	59.94	9,051.7	69.99	1,216.5	30.74	480.5	48.97	4,487.2	64.53	
2,672.2	13.85	2,515.8	14.04	1,195.0	9.21	1,198.5	30.30	122.3	12.46	987.2	14.20	
197.7	1.02	193.8	1.08	26.7	.21	158.8	4.01	8.3	.86	85.3	1.22	
44.4	.24	42.2	.24	4.7	.03	37.0	.93	0.7	.07	15.4	.22	
30.4	.16	29.2	.16	3.7	.03	25.3	.63	0.2	.02	10.1	.14	

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Shipments of Scrap Metal

Total	In %	Steel Chips	In %	Steel Shavings	In %	Cast-Iron Waste	In %	Ferro-alloys Waste	In %	Thin Sheet Metal Waste	In %
1,153.9	14.13	858.4	18.67	107.6	11.81	170.2	8.90	1.2	.38	16.5	3.71
1,035.8	12.68	766.6	16.67	104.9	11.52	151.8	7.94	0.5	.16	12.0	2.71
280.0	3.42	175.8	3.84	38.1	4.19	44.7	2.34	4.9	1.61	16.5	3.72
1,914.9	23.44	1,107.1	24.07	29.3	3.21	730.1	38.20	16.3	5.33	32.1	7.25
1,734.6	21.23	964.6	20.97	20.9	2.29	709.8	37.12	13.6	4.51	25.8	5.82
1,468.3	17.99	458.0	9.97	328.8	36.10	470.8	24.64	118.4	38.70	92.3	20.83
117.8	1.44	82.4	1.79	4.3	.48	23.4	1.23	0.8	.26	6.9	1.56
145.3	1.77	110.3	2.40	4.7	.51	24.4	1.27	1.0	.32	4.9	1.10
221.8	2.77	163.9	3.55	5.3	.58	40.3	2.11	0.1	.03	12.2	2.78

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Agriculture	551.5	2.69	385.1	3.04	4.4	.34	126.6	2.86	10.0	.92	23.4	2.36
Republic industries	493.5	2.41	290.6	2.30	22.2	1.73	142.7	3.17	2.0	.18	36.0	3.63
Industrial coope- ratives	270.0	1.32	136.3	1.08	18.0	1.40	10.2	.23	--	--	105.5	10.64
Other industries	4,170.3	20.34	2,409.2	19.05	488.0	37.95	699.0	15.55	421.9	38.84	152.2	15.35
Scrap from the population	197.7	.96	127.5	1.01	--	--	45.5	1.01	--	--	24.7	2.49
Total	20,509.9 [sic]	100	12,649.3	100	1,285.7 [sic]	100	4,497.0	100	1,086.1	100	991.8	100

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81.4	.43	46.7	.26	1.5	.01	44.7	1.13	0.5	.05	23.1	.33
248.7	1.29	234.0	1.30	55.9	.43	178.1	4.50	--	--	154.3	2.22
83.3	.43	83.3	.07	8.9	.07	74.4	1.88	--	--	75.0	1.08
3,527.7	18.28	3,504.8	18.34	2,383.4	18.34	756.5	19.13	364.9	37.19	874.5	12.58
--	--	--	--	--	--	--	--	--	--	--	--
19,292.8	100	17,932.2	100	12,994.2	100	3,956.8	100	981.2	100	6,953.7	100

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493.3	6.03	354.8	7.72	4.4	.49	107.1	5.60	9.3	3.64	17.7	4.00
359.2	4.88	247.1	5.37	22.2	2.44	105.8	5.54	2.0	.66	22.1	4.99
261.8	3.20	136.0	2.96	18.0	1.98	4.2	.22	--	--	103.6	23.38
1,516.8	18.56	778.5	16.93	346.0	38.21	144.7	7.57	152.0	49.67	93.6	21.11
197.7	2.42	127.5	2.83	--	--	45.5	2.38	--	--	24.7	5.57
8,170.8	$\frac{100}{\text{sic}}$	4,599.8	$\frac{100}{\text{sic}}$	910.7	100	1,911.2	100	306.0	$\frac{100}{\text{sic}}$	443.1	100

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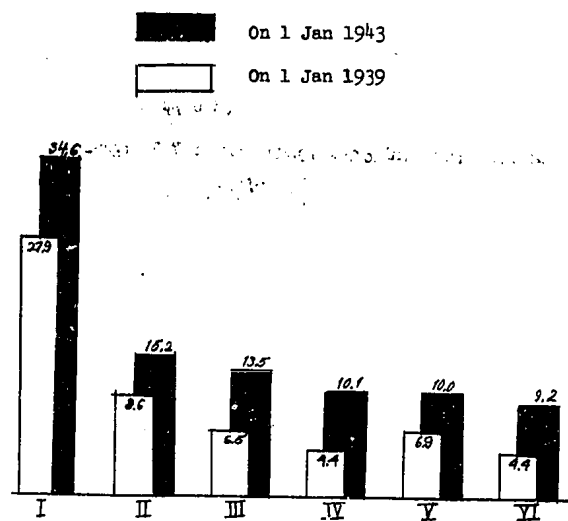
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Figure 1. Metal Reserves of Individual Branches of the National Economy
(million tons)



- I. Railroad transport
- II. Republic industries
- III. Metallurgical and chemical industries
- IV. Machine building and power industry
- V. Agriculture
- VI. Fuel industry

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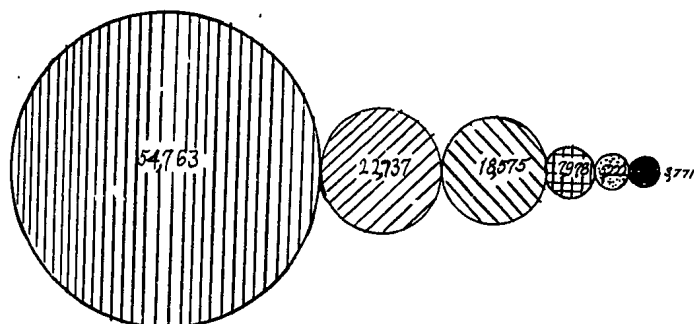
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Figure 2. Metal Reserves in Chief Means of Production and Consumers' Goods on
1 January 1943
(1,000 tons)



Buildings and structures



Machines, transmissions,
installations, and instruments



Means of transportation



Nonindustrial capital goods



Power machinery and installations



Iron contained in consumers' goods

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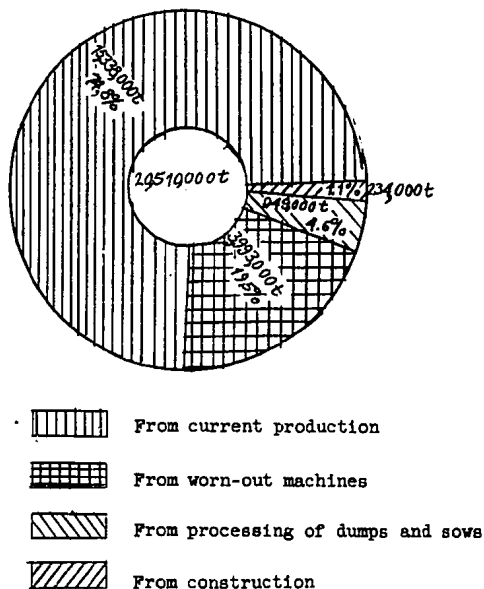
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Figure 3. Sources of Scrap Formation and Iron Waste
in the USSR in 1942



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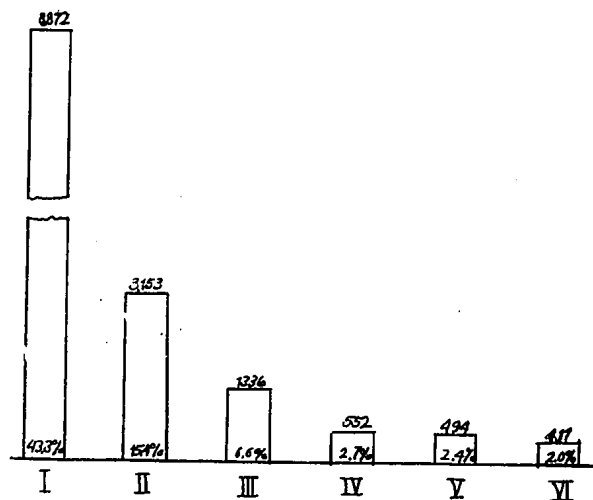
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Figure 4. Iron Scrap Formation in
Individual Branches of USSR Industry in 1942
(1,000 tons)



- I. Ferrous metallurgy
- II. Machine building and power industry
- III. Transportation (railroad)
- IV. Agriculture
- V. Republic industries
- VI. Fuel industry

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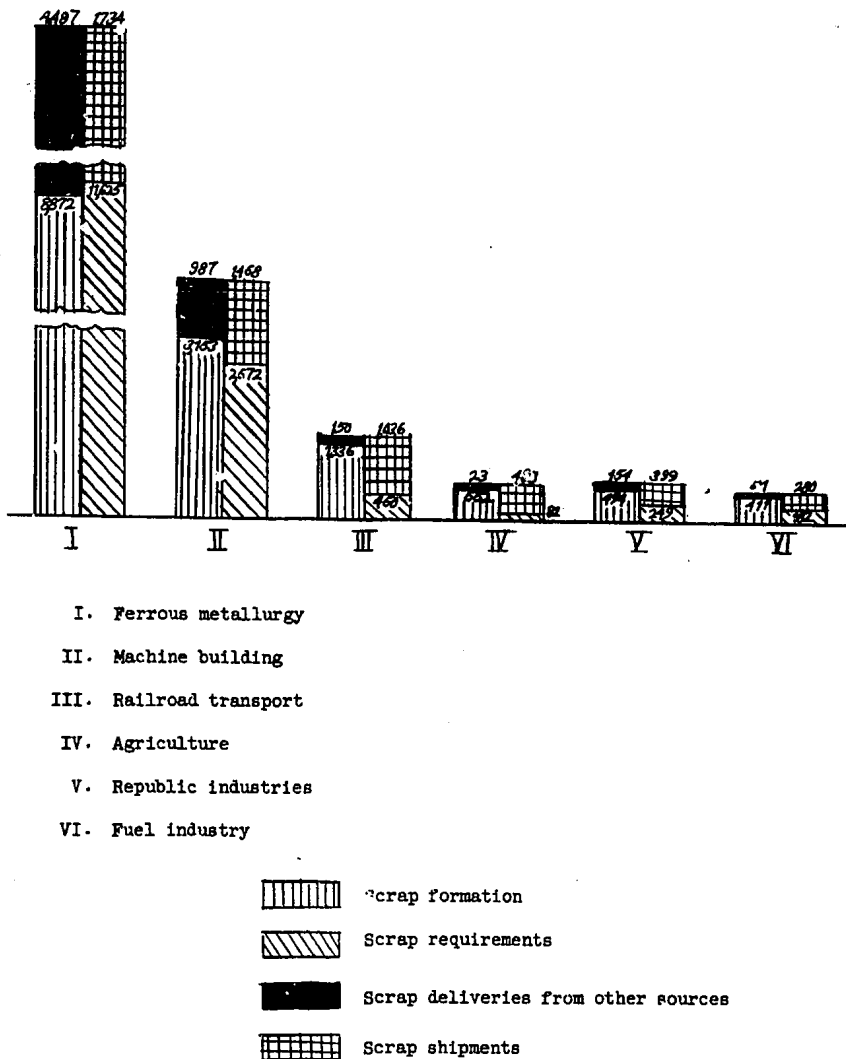
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Figure 5. Scrap Balances of Various Branches of Industry in 1942
(1,000 tons)



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